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D'APPOLONIA CONSULTING ENGINEERS INC PITTSBURGH PA

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NATIONAL DAM INSPECTION PROGRAM. LAKE SABULA DAM (NDI ID NUMBER--ETC(U)

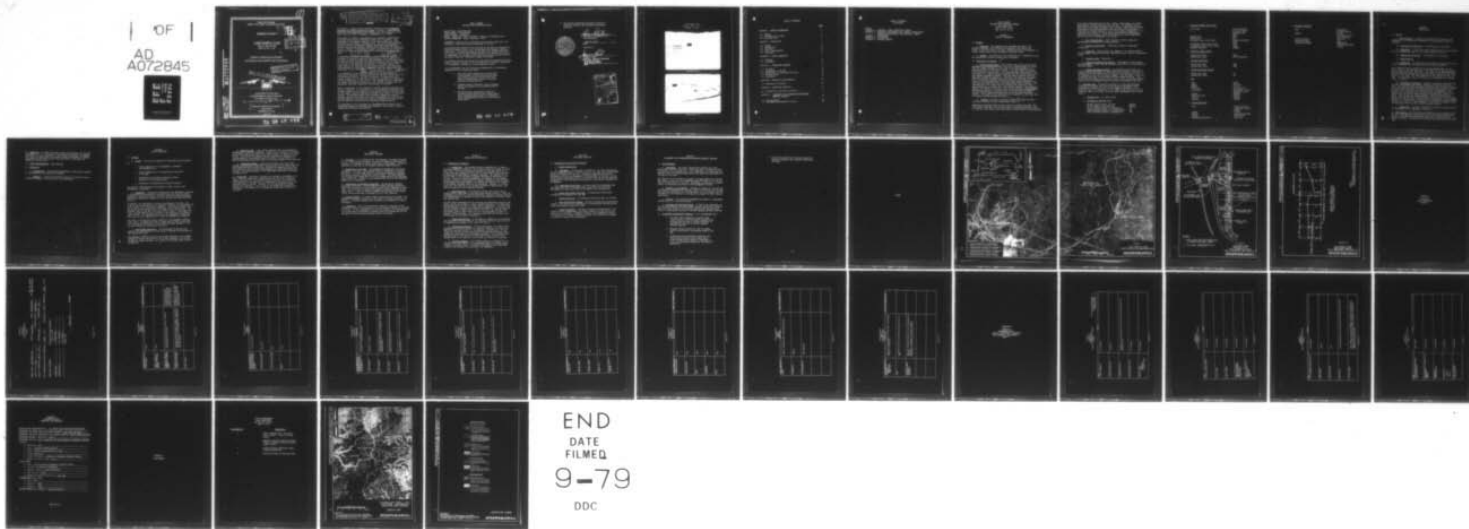
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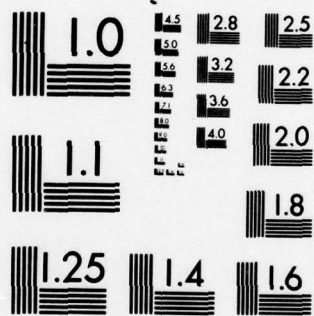
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OHIO RIVER BASIN  
SANDY LICK CREEK, CLEARFIELD COUNTY

PENNSYLVANIA

LAKE SABULA DAM

NDI I.D. NO: PA-425

DER I.D. NO: 17-10

LEVEL

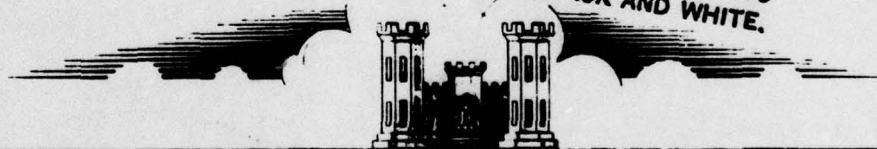
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PHASE I INSPECTION REPORT  
NATIONAL DAM INSPECTION PROGRAM

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DEPARTMENT OF THE ARMY  
BALTIMORE DISTRICT, CORPS OF ENGINEERS  
BALTIMORE, MARYLAND 21203

Contract # DACW 31-79-C-0014  
BY

D'APPOLONIA CONSULTING ENGINEERS

10 DUFF ROAD

PITTSBURGH, PA. 15235

JUNE 1979

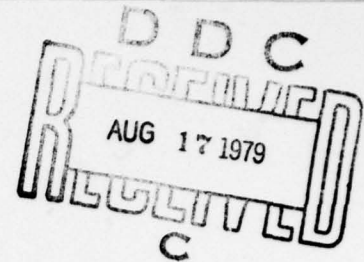
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6 National Dam Inspection Program.  
Lake Sabula Dam (NDI ID Number: PA-425  
DER ID Number: 17-10), Ohio River Basin,  
Sandy Lick Creek, Clearfield County,  
Pennsylvania. Phase I Inspection Report

PREFACE



This report is prepared under guidance contained in the Recommended Guidelines for Safety Inspection of Dams, for Phase I Investigations. Copies of these guidelines may be obtained from the Department of the Army, Office of Chief of Engineers, Washington, D.C. 20314.

The purpose of a Phase I investigation is to identify expeditiously those dams which may pose hazards to human life or property. The assessment of the general condition of the dam is based upon visual observations and review of available data. Detailed investigation and analyses involving topographic mapping, subsurface investigations, material testing, and detailed computational evaluations are beyond the scope of a Phase I investigation; however, the inspection is intended to identify any need for such studies which should be performed by the owner.

11 Jun 79 12 45 p.  
In reviewing this report, it should be realized that the reported condition of the dam is based on observations of field conditions at the time of inspection along with data available to the inspection team. In cases where the reservoir was lowered or drained prior to inspection, such action, while improving the stability of the dam, removes the normal load on the structure and may obscure certain conditions which might otherwise be detectable if inspected under the normal operating environment of the structure.

15 DACW31-79-C-0014  
It is important to note that the condition of the dam depends on numerous and constantly changing internal and external factors which are evolutionary in nature. It would be incorrect to assume that the present condition of the dam will continue to represent the condition of the dam at some point in the future. Only through frequent inspections can unsafe conditions be detected and only through continued care and maintenance can these conditions be prevented or corrected.

Phase I inspections are not intended to provide detailed hydrologic and hydraulic analyses. In accordance with the established Guidelines, the spillway design flood is based on the estimated "Probable Maximum Flood" for the region (greatest reasonably possible storm runoff), or fractions thereof. The spillway design flood provides a measure of relative spillway capacity and serves as an aid in determining the need for more detailed hydrologic and hydraulic studies, considering the size of the dam, its general condition and the downstream damage potential.

The assessment of the conditions and recommendations was made by the consulting engineer in accordance with generally and currently accepted engineering principles and practices.

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PHASE I REPORT  
NATIONAL DAM INSPECTION PROGRAM

NAME OF DAM: Lake Sabula Dam  
STATE LOCATED: Pennsylvania  
COUNTY LOCATED: Clearfield  
STREAM: Sandy Lick Creek, secondary tributary of Allegheny River  
DATE OF INSPECTION: April 4 and May 4, 1979

ASSESSMENT: Based on the evaluation of the existing conditions, the condition of Lake Sabula Dam is considered to be fair.

Field observations indicate that the crest of the dam is irregular with elevations ranging from 2.5 to 6.8 feet above the emergency spillway crest level. The upstream slope of the dam has no erosion protection and due to wave action has partially eroded. The remaining portions of the embankment, the spillway, and outlet works structures were found to be in fair condition, revealing no signs of distress.

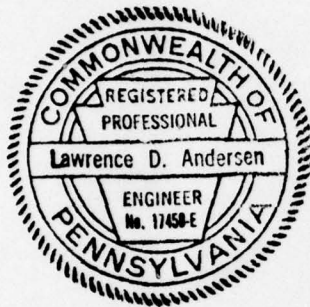
The spillway capacity was found to be less than the recommended spillway capacity range of 100-year to one-half PMF and is therefore classified to be inadequate according to the recommended criteria.

It is recommended that the following recommendations be implemented immediately or on a continuing basis:

1. The owner should immediately initiate additional studies to more accurately ascertain the spillway capacity and the nature and extent of improvements required to provide adequate spillway capacity.
2. Adequate erosion protection, such as riprap, should be provided on the upstream slope of the dam.
3. Around-the-clock surveillance should be provided during unusually heavy runoff and a formal warning system should be developed to alert the downstream residents in the event of emergencies.

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4. The dam and appurtenant structures should be inspected regularly and necessary maintenance performed.



*Lawrence D. Andersen*

Lawrence D. Andersen, P.E.  
Vice President

June 25, 1979

Date

Approved by:

*James W. Peck*

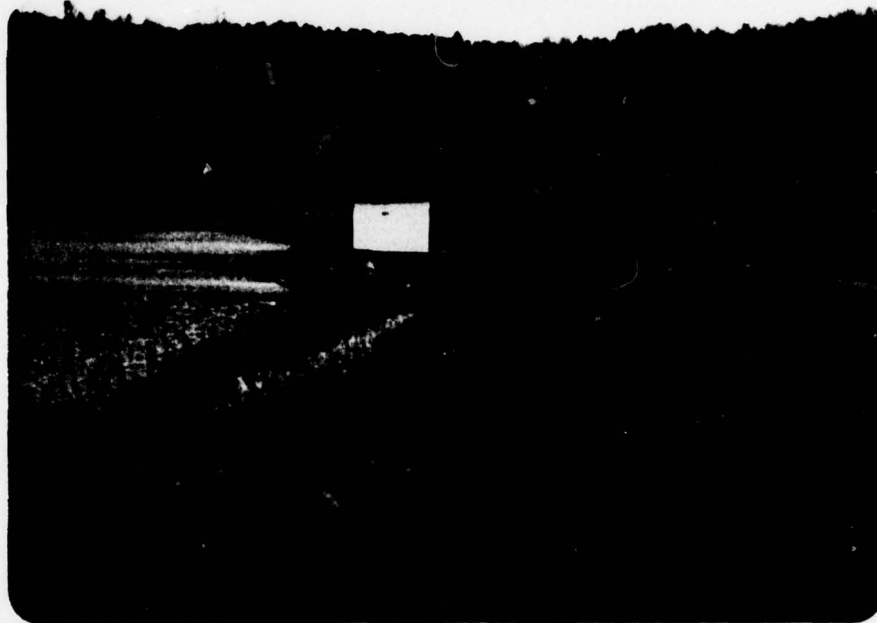
JAMES W. PECK  
Colonel, Corps of Engineers  
District Engineer

27 July 1979

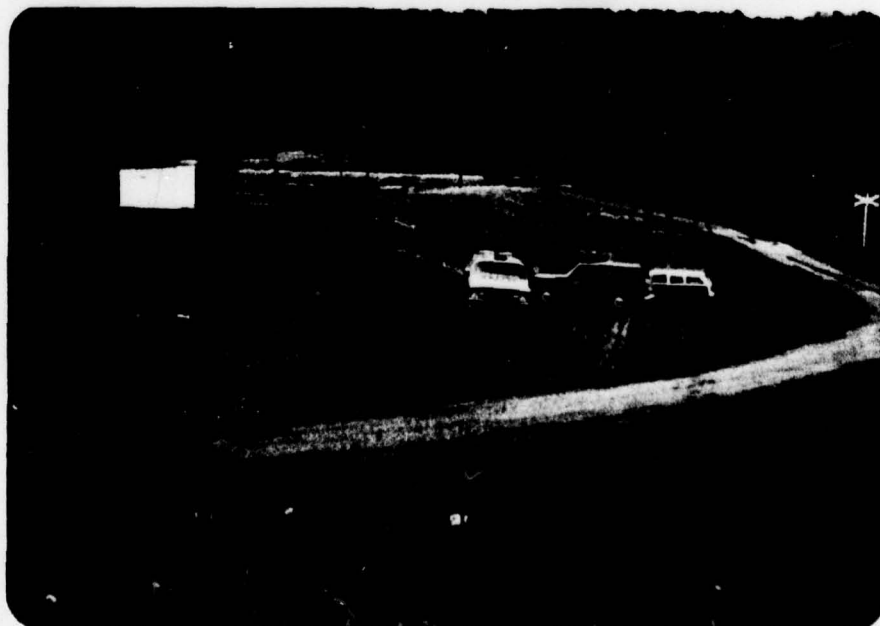
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LAKE SABULA DAM  
NDI I.D. NO. PA-425  
APRIL 4, 1979



Upstream Face



Downstream Face



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PHASE I REPORT  
NATIONAL DAM INSPECTION PROGRAM  
LAKE SABULA DAM  
NDI I.D. NO. PA-425  
DER I.D. NO. 17-10

SECTION 1  
PROJECT INFORMATION

1.1 General

a. Authority. The inspection was performed pursuant to the authority granted by The National Dam Inspection Act, Public Law 92-367, to the Secretary of the Army, through the Corps of Engineers, to conduct inspections of dams throughout the United States.

b. Purpose. The purpose of this inspection is to determine if the dam constitutes a hazard to human life or property.

1.2 Description of Project

a. Dam and Appurtenances. Lake Sabula Dam consists of an earth embankment approximately 600 feet long with a maximum height of 22 feet from the highest elevation on the crest of the dam measured to the downstream invert of the outlet conduit. The crest width of the dam varies between 20 and 26 feet. The flood discharge facilities for the dam consist of a primary spillway combined with the outlet works and an open channel emergency spillway. Both the primary spillway and the emergency spillway structures are located at the center of the embankment. The primary spillway structures consist of an intake tower located on the upstream side of the crest which drains through two 24-inch cast-iron pipes into the reinforced concrete outlet conduit. The upstream end of the intake tower is equipped with stop logs, which permit adjusting the normal pool level of the reservoir. The emergency spillway is located to the left of the primary spillway (~~looking downstream~~) and consists of a 20-foot-wide, 2-1/2-foot deep rectangular concrete channel which discharges into the outlet works discharge channel. The reservoir can be drained by the removal of stop logs from the primary spillway intake structure.

b. Location. The dam is located on Sandy Lick Creek in Sandy Township, Clearfield County, Pennsylvania (Plate 1).

Immediately downstream from the dam, Sandy Lick Creek flows under the Penn Central Railroad, then flows southwest, meandering through a 1000- to 1500-foot wide valley, and flows under Interstate Route 80 approximately

2-1/2 miles downstream from the dam. DuBois, Pennsylvania, is located approximately 4 miles downstream from the dam. The drainage area of Sandy Lick Creek rapidly increases below the dam. There are two houses approximately one mile downstream from the dam within the potential flood plain of Sandy Lick Creek. One of the houses is abandoned. It is estimated that failure of the dam would cause property damage along Sandy Lick Creek; however, since the flood plain is wide, significant loss of life is not considered to be likely.

c. Size Classification. Small (based on 22-foot height and approximately 500 acre-feet storage capacity).

d. Hazard Classification. Significant (based on downstream conditions).

e. Ownership. Sabula Outing Club (address: Mr. Harold Portzer, Vice President, Sabula Outing Club, 500 DuBois Street, Dubois, Pennsylvania 15801).

f. Purpose of Dam. Recreation.

g. Design and Construction History. According to a state report dated September 1, 1915, the dam was built about 1870 by the Pennsylvania Railroad Company.

h. Normal Operating Procedure. As indicated by the owner, the normal operating procedure for Lake Sabula Dam consists of lowering the reservoir below dock levels during the winter and raising the pool to the emergency crest level during the summer. The lake level is adjusted by placing stop logs in the primary spillway intake structure. The inflow occurring when the lake level is at or above the primary spillway crest level is discharged through the primary and emergency spillways.

1.3 Pertinent Data. Elevations referred to in this and subsequent sections of the report were calculated based on approximate field measurements assuming the crest of the emergency spillway to be at Elevation 1461, U.S. Geological Survey (USGS) datum, which is the pool elevation shown on the USGS 7.5-minute Sabula quadrangle (photorevised 1971).

a. Drainage Area - 3.6 square miles

b. Discharge at Dam Site (cfs)

Maximum known flood at dam site	Unknown
Outlet conduit at maximum pool	Unknown
Gated spillway capacity at maximum pool	N/A
Ungated spillway capacity at maximum pool	245
Total spillway capacity at maximum pool	245



c. Elevation (USGS) Datum (feet)

Top of dam	1463.5 (measured low spot); 1467.8 (measured high spot)
Maximum pool	1463.5
Normal pool	1461
Upstream invert outlet works	Unknown (estimated 1451)
Downstream invert outlet works	1444+
Streambed at center line of dam	1444+
Maximum tailwater	Unknown

d. Reservoir Length (feet)

Normal pool level	4000
Maximum pool level	4500 (estimated)

e. Storage (acre-feet)

Normal pool level	307+
Maximum pool level	500+

f. Reservoir Surface (acres)

Normal pool level	42
Maximum pool level	57+

g. Dam

Type	Earth
Length	600 feet
Height	22 feet
Top width	20 to 26 feet
Side slopes	Downstream: 4H:1V Upstream: 1H:1V
Zoning	Unknown
Impervious core	Unknown
Cutoff	Unknown
Grouting	Unknown

h. Regulating Outlet

Type	4-foot by 8-foot reinforced concrete conduit
Length	40 feet
Closure	Stop logs upstream
Access	Intake tower
Regulating facilities	Stop logs



1. Emergency Spillway

Type

Rectangular  
overflow section

Length

20 feet  
(perpendicular to  
flow direction)

Crest elevation

1461 feet

Upstream channel

Lake

Downstream channel

Rectangular  
concrete discharge  
channel

SECTION 2  
DESIGN DATA

2.1 Design

a. Data Available. Available information was provided by the Commonwealth of Pennsylvania, Department of Environmental Resources (PennDER).

- (1) Hydrology and Hydraulics. No information is available.
- (2) Embankment. A 1915 state report indicates that it was believed that no drawings were made for the construction of this dam.
- (3) Appurtenant Structures. No information is available.

b. Design Features

- (1) Embankment. No information is available to ascertain the type of the embankment and the manner in which it was constructed.

As it presently exists, measured from the downstream invert of the outlet works to the high elevation on the crest of the dam, the embankment is approximately 22 feet high. The height of the embankment when measured from the average crest elevation in the vicinity of the toe is about 11 to 12 feet. The crest width of the dam varies from 20 to 26 feet. The downstream face of the dam has a 4 horizontal to 1 vertical slope, or flatter.

- (2) Appurtenant Structures. Available information indicates that the existing emergency and primary spillways were constructed about 1964. The combined primary spillway and outlet works structures include an intake tower located on the upstream side of the crest and a 4-foot by 8-foot reinforced concrete conduit through the embankment. The intake tower is equipped with stop logs on the upstream side and discharges into the outlet conduit through 24-inch-diameter cast-iron pipes. Flow through the primary spillway, which also constitutes the outlet works for the dam, is controlled by the stop logs. The emergency spillway is a 20-foot-wide, 2-1/2-foot-deep rectangular concrete channel located at the center of the embankment. Flow from the emergency spillway discharges into the outlet works discharge channel.

c. Design Data. Available information includes no design data for the embankment or its appurtenant structures.

2.2 Construction. No information is available on the construction of the dam. Correspondence files indicate that the original timber spillway of the dam was repaired numerous times over the years and was finally replaced by the presently existing reinforced structure in about 1964.

2.3 Operation. No formal operating records are available for the dam. According to the vice president of the Sabula Outing Club, the highest pool level in recent years has occurred during the passage of Tropical Storm Agnes in 1972 and the pool level was about 2 feet above the emergency spillway crest.

2.4 Other Investigations. None reported.

2.5 Evaluation

a. Availability. The available information, which mostly consists of correspondence, was provided by PennDER.

b. Adequacy. Available information includes no technical data to assess the adequacy of the design or the construction.



SECTION 3  
VISUAL INSPECTION

3.1 Findings

a. General. The on-site inspection of Lake Sabula Dam consisted of:

1. Visual inspection of the embankment, abutments, and embankment toe.
2. Visual examination of the appurtenant structures of the dam.
3. Observation of the factors affecting runoff potential of the drainage basin.
4. Evaluation of downstream area hazard potential.

The specific observations are illustrated in Plate 2 and in the photographs in Appendix C.

b. Embankment. The general inspection of the embankment consisted of searching for indications of structural distress, such as cracks, subsidence, bulging, wet areas, seeps and boils, and observing general maintenance conditions, vegetative cover, erosion, and other surficial features.

In general, the condition of the dam is considered to be fair. The crest of the dam was found to be irregular. However, the irregularities do not appear to be from recent movements. The upstream slope of the dam has no erosion protection and has eroded due to wave action. The upstream slope of the dam, from crest level to about 5 feet below the crest, is approximately one horizontal to one vertical, and steeper at some sections. The remaining portions of the embankment, downstream face, and toe were inspected and no signs of distress were observed.

The crest of the dam was surveyed relative to the emergency spillway crest level. Freeboard was found to range from 2.5 feet on each side of the emergency spillway to 5.8 feet near the right abutment. The dam crest profile is illustrated in Plate 3.

c. Appurtenant Structures. The appurtenant structures were examined for deterioration or other signs of distress and obstructions that would limit flow.

The emergency spillway structures and visible portions of the primary spillway structures were found to be in fair condition. Due to flow through the primary spillway, the inside of the intake tower could not be examined.



d. Reservoir Area. A map review indicates that the watershed is predominantly covered by woodlands. Several rural residential buildings are scattered along State Route 255, which follows the Sandy Lick Creek valley. A review of the regional geology (Appendix E) indicates that the shorelines of the reservoir are not likely to be susceptible to massive landslides which would affect the storage volume of the reservoir.

e. Downstream Channel. Below the dam, Sandy Lick Creek flows through an essentially uninhabited valley except for two homes about one mile downstream from the dam before reaching the commercial and industrial areas of DuBois located approximately four miles downstream from the dam. Further description of the downstream conditions is included in Section 1.2b.

3.2 Evaluation. The overall condition of the dam is considered to be fair. The most significant condition noted is the lack of adequate erosion protection on the upstream slope of the dam. On the date of field inspection, the owner was in the process of placing fill on the upstream slope of the dam. However, the fill was being end dumped without any compaction. Due to lack of any design and construction information, the adequacy of the design and construction could not be assessed.

## SECTION 4 OPERATIONAL FEATURES

4.1 Procedure. It is reported that the reservoir is normally lowered by 4 to 5 feet during the winter to avoid ice damage to boat docks and raised to the emergency spillway crest level in the summer. Outflow is regulated by stop logs in the primary spillway intake structure.

4.2 Maintenance of the Dam. The maintenance condition of the dam is considered to be poor. The upstream slope of the dam has no erosion protection. A 5-foot-high section of the upstream slope is irregular and steep, apparently eroded due to wave action. The owner reported that attempts were being made to fill the eroded areas on the upstream slope of the dam. However, it was observed that the fill was being end dumped with no compaction.

4.3 Maintenance of Operating Facilities. The dam has no operable mechanical facilities. Flow through the primary spillway structures which also constitute the outlet works of the dam is controlled by stop logs. The stop logs are placed with manually operated winches in the intake tower. As far as could be assessed from the top of the intake tower, the stop logs were considered to be in fair condition.

4.4 Warning System. No formal warning system exists for the dam. The members of the Sabula Outing Club, the owner of the dam, reside at the dam site. Telephone communication facilities are available via their residences.

4.5 Evaluation. While the maintenance condition of the dam is considered to be poor, the condition of the operating facilities is assessed to be fair. It is recommended that any fill placed on the upstream face of the dam should be adequately compacted and the upstream face of the dam should be provided with adequate erosion protection.

SECTION 5  
HYDRAULICS AND HYDROLOGY

5.1 Evaluation of Features

a. Design Data. Lake Sabula Dam has a watershed of 3.6 square miles and impounds a reservoir with a surface area of 42 acres at normal pool level. The flood discharge facilities for the dam consist of a primary spillway through which the flow is controlled by stop logs and an uncontrolled open-channel emergency spillway. The capacity of the 20-foot-wide, 2-1/2-foot-deep, emergency spillway is calculated to be 245 cfs. Because no design information is available for the primary spillway and due to flow through the primary spillway, which precluded taking appropriate measurements for capacity calculation, the capacity of the primary spillway could not be calculated. However, it is estimated that the capacity of the primary spillway is significantly less than the capacity of the emergency spillway.

b. Experience Data. As previously stated, Lake Sabula Dam is classified as a small dam in the significant hazard category. Under the recommended criteria for evaluating emergency spillway discharge capacity, such impoundments are required to pass a flow between the 100-year flood and one-half PMF.

The PMF inflow hydrograph for the reservoir was determined using the Dam Safety Version of the HEC-1 computer program developed by the Hydrologic Engineering Center of the U.S. Army, Corps of Engineers. The data used for the computer analysis are presented in Appendix D. The one-half PMF inflow was found to have a peak flow of 1922 cfs. The 100-year flood was found to have a peak flow of 775 cfs, corresponding to about 15 percent of PMF peak flow. The computer outputs and the 100-year flood calculations are included in Appendix D.

c. Visual Observations. On the dates of inspection, no conditions were observed that would indicate the emergency spillway capacity would be significantly reduced in the event of a flood.

d. Overtopping Potential. Various percentages of the PMF inflow hydrograph were routed through the reservoir starting from normal pool elevation using the capacity of the emergency spillway only. It was found that the dam can pass approximately 10 percent PMF without overtopping the side walls of the emergency spillway. For 50 percent PMF, the dam would be overtopped for a duration of about 20 hours with a maximum depth of 1.4 feet over the low spot on the crest of the dam.

e. Spillway Adequacy. The spillway capacity is estimated to be less than the lower limit of the recommended range of spillway design floods, the 100-year flood. Therefore, according to the recommended criteria, the spillway is classified to be inadequate.



## SECTION 6 STRUCTURAL STABILITY

### 6.1 Evaluation of Structural Stability

#### a. Visual Observations

(1) Embankment. As discussed in Section 3, the field observations did not reveal any signs of distress at this time that would significantly affect the stability of the dam. Although no quantitative data are available to aid in the assessment of the stability of the dam, in view of the shallow downstream slopes and the fact that the dam has performed adequately for over 100 years, the stability of the dam is considered to be adequate.

(2) Appurtenant Structures. As far as could be determined from the visual portions of the appurtenant structures, the structural performance of these structures is considered to be satisfactory.

b. Design and Construction Data. No design and construction information is available for this dam.

c. Operating Records. No operating records are kept for the dam.

d. Post-Construction Changes. The only reported post-construction change to the dam was the construction of the presently existing outlet works and emergency spillway in 1964.

e. Seismic Stability. The dam is located in Seismic Zone 1, and based on visual observations, the static stability of the dam is considered to be adequate. Therefore, based on the recommended criteria for evaluation of seismic stability of dams, the structure is presumed to present no hazard from earthquakes.



SECTION 7  
ASSESSMENT AND RECOMMENDATIONS/PROPOSED REMEDIAL MEASURES

7.1 Dam Assessment

a. Assessment. The visual observations indicate that Lake Sabula Dam is in fair condition. Other than lack of adequate erosion protection on the upstream slope of the embankment, no conditions were observed that would significantly affect the structural performance of the dam at this time.

The capacity of the spillway was found to be approximately 10 percent PMF, which is less than the recommended capacity based on the size and hazard classification for the dam. Therefore, the spillway is classified to be inadequate according to the recommended criteria.

b. Adequacy of Information. Although no design and construction information is available for the dam, in view of the fact that the dam has performed adequately for over 100 years, it is considered that the assessment of the condition of the dam can be based on visual observations alone.

c. Urgency. The following recommendations should be implemented immediately or on a continuing basis.

d. Necessity for Additional Data. In view of the inadequacy of the spillway capacity, the owner should initiate additional studies to more accurately ascertain the spillway capacity and the nature and extent of improvements required to provide adequate spillway capacity.

7.2 Recommendations/Remedial Measures. It is recommended that:

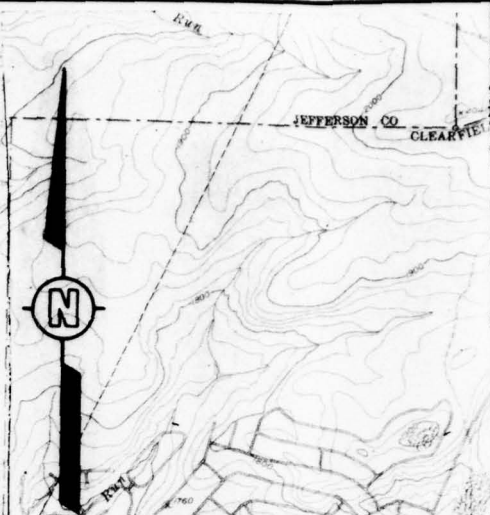
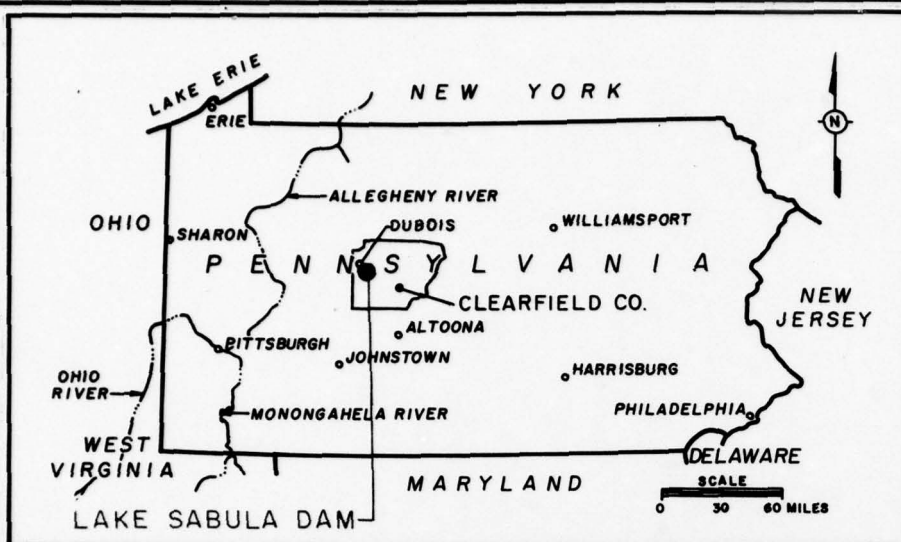
1. The owner should immediately initiate additional studies to more accurately ascertain the spillway capacity and the nature and extent of improvements required to provide adequate spillway capacity.
2. Adequate erosion protection, such as riprap, should be provided on the upstream slope of the dam.
3. Around-the-clock surveillance should be provided during unusually heavy runoff and a formal warning system should be developed to alert the downstream residents in the event of emergencies.

4. The dam and appurtenant structures should be inspected regularly and necessary maintenance performed.

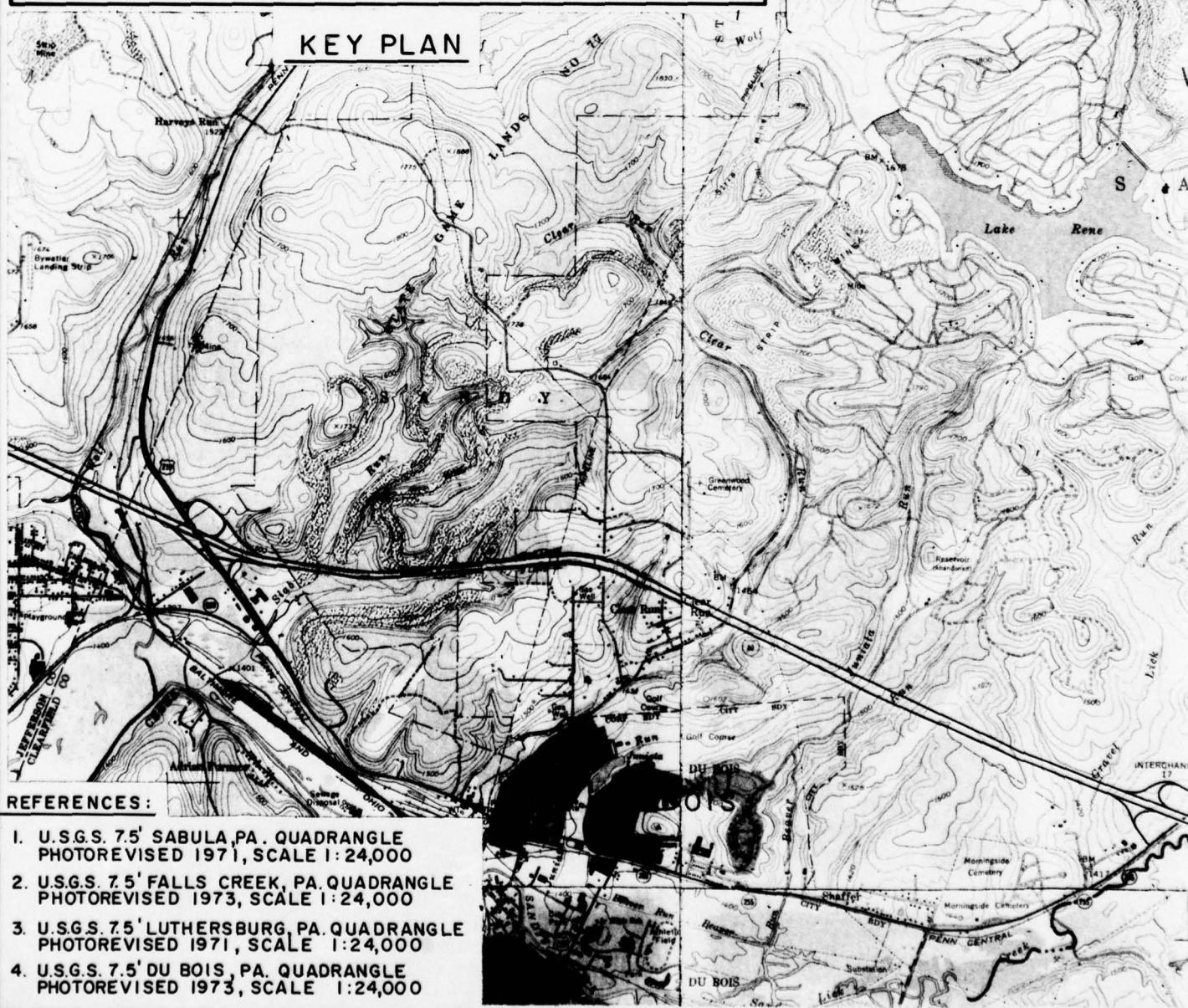
**PLATES**



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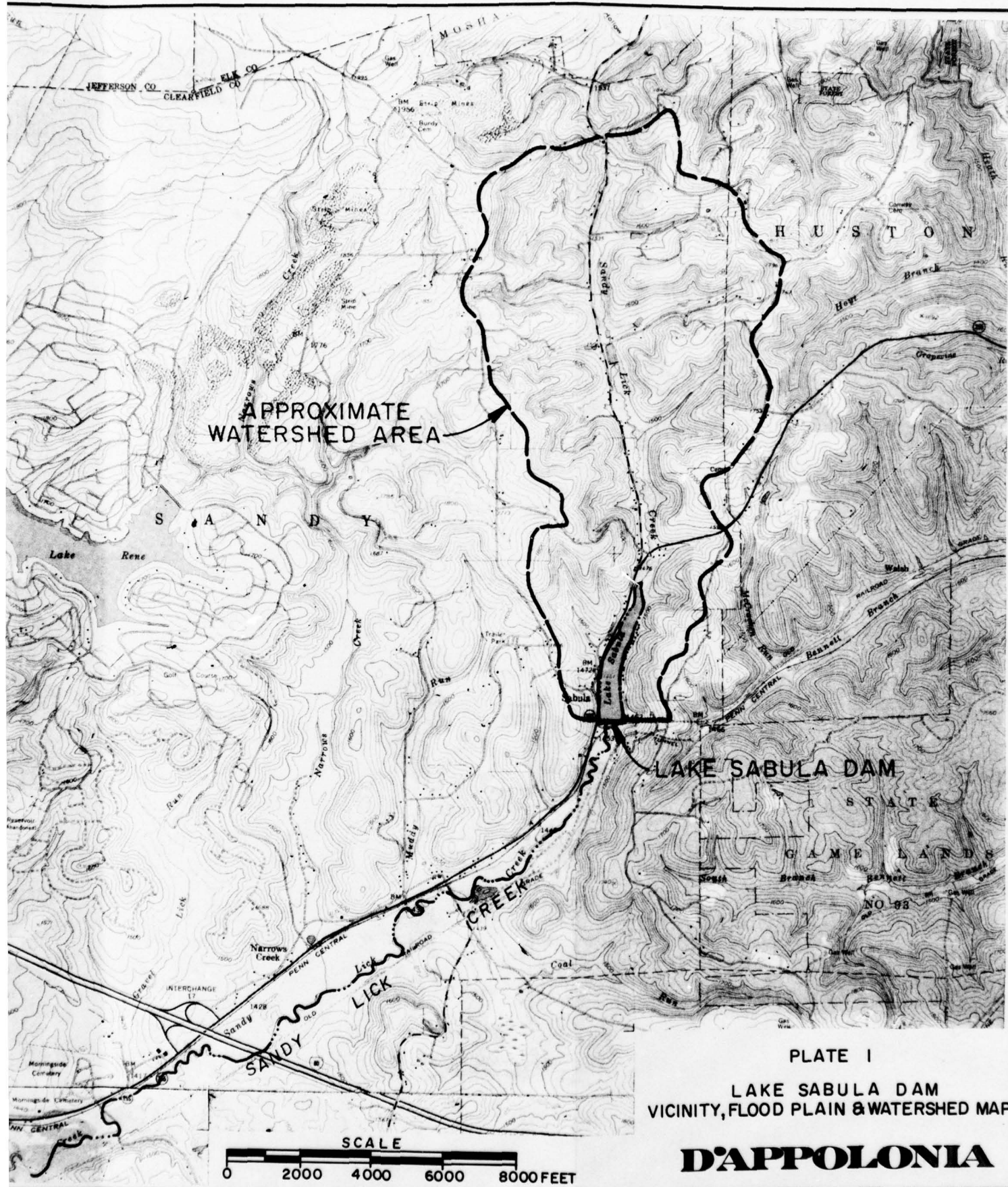


### KEY PLAN



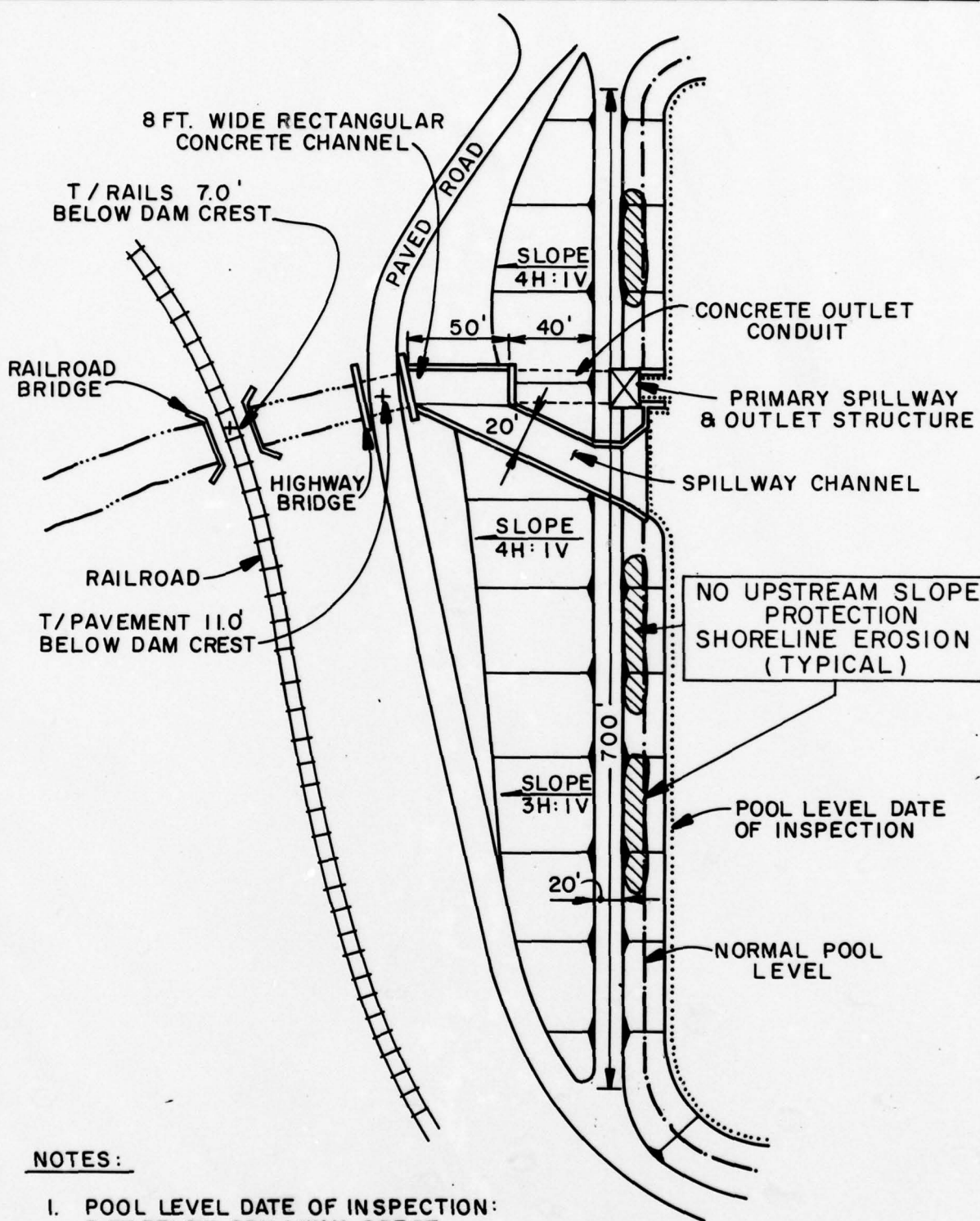
### REFERENCES:

1. U.S.G.S. 7.5' SABULA, PA. QUADRANGLE  
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2. U.S.G.S. 7.5' FALLS CREEK, PA. QUADRANGLE  
PHOTOREVISED 1973, SCALE 1:24,000
3. U.S.G.S. 7.5' LUTHERSBURG, PA. QUADRANGLE  
PHOTOREVISED 1971, SCALE 1:24,000
4. U.S.G.S. 7.5' DU BOIS, PA. QUADRANGLE  
PHOTOREVISED 1973, SCALE 1:24,000





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#### NOTES:

1. POOL LEVEL DATE OF INSPECTION: 5 FT. BELOW SPILLWAY CREST
2. SPILLWAY FREEBOARD = 2.5 FT.

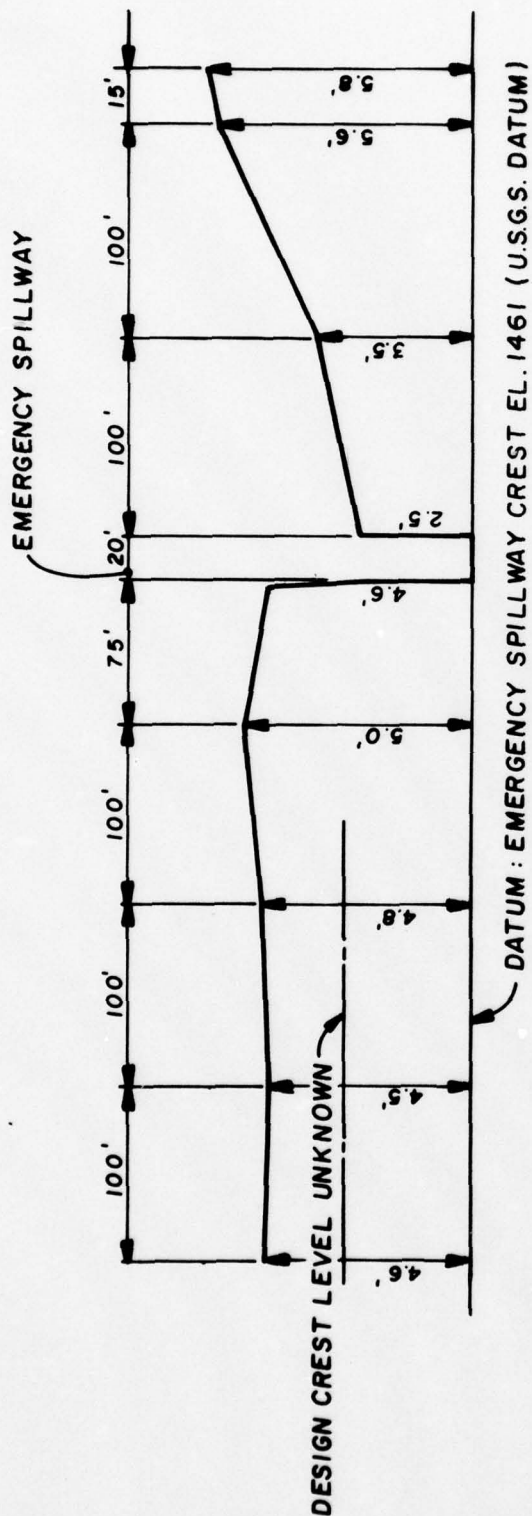
PLATE 2

LAKE SABULA DAM  
GENERAL PLAN  
FIELD INSPECTION NOTES  
FIELD INSPECTION DATE: APR. 4, 79

**D'APPOLONIA**



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# **DAM CREST PROFILE** (LOOKING DOWNSTREAM)

NOTE:  
DAM CREST IS SURVEYED RELATIVE  
TO EMERGENCY SPILLWAY CREST LEVEL

PLATE 3

LAKE SABULA DAM  
DAM CREST SURVEY  
FIELD INSPECTION DATE: APR. 4, 79  
**D'APPOLONIA**

APPENDIX A  
CHECKLIST  
VISUAL INSPECTION  
PHASE I

APPENDIX A

CHECKLIST  
VISUAL INSPECTION  
PHASE I

NAME OF DAM Lake Sabula Dam COUNTY Clearfield STATE Pennsylvania ID# NDI I.D. PA-425  
DER I.D. 17-10

TYPE OF DAM Earth HAZARD CATEGORY Significant

DATE(S) INSPECTION April 4, 1979 WEATHER Rainy TEMPERATURE 40s

POOL ELEVATION AT TIME OF INSPECTION 1456+ M.S.L. TAILWATER AT TIME OF INSPECTION 1446+ M.S.L.

INSPECTION PERSONNEL:

Bilgin Erel  
Wah-Tak Chan

REVIEW INSPECTION PERSONNEL:  
(May 4, 1979)

E. D'Appolonia  
L. D. Andersen  
J. H. Poellot  
Bilgin Erel

Bilgin Erel RECORDER



VISUAL INSPECTION  
PHASE I  
EMBANKMENT

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
SURFACE CRACKS	None.	
UNUSUAL MOVEMENT OR CRACKING AT OR BEYOND THE TOE	None.	
SLOUCHING OR EROSION OF EMBANKMENT AND ABUTMENT SLOPES	The upstream slope of the dam is steep. Apparently has eroded due to wave action.	The eroded areas on the upstream slope should be filled with adequately compacted fill and should be protected against erosion.
VERTICAL AND HORIZONTAL ALIGNMENT OF THE CREST	The crest of the dam is highly irregular. Crest levels range between 2.5 feet above the emergency spillway crest level at the center of the embankment to 5.8 feet near the right abutment.	Regrading of the crest should be considered in conjunction with further hydrologic and hydraulic studies.
RIPRAP FAILURES		

VISUAL INSPECTION  
PHASE I  
EMBANKMENT

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
JUNCTION OF EMBANKMENT AND ABUTMENT, SPILLWAY AND DAM	No signs of distress.	
ANY NOTICEABLE SEEPAGE	None found.	
STAFF GAGE AND RECORDER	None.	
DRAINS	None.	

VISUAL INSPECTION  
PHASE 1  
OUTLET WORKS

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
CRACKING AND SPALLING OF CONCRETE SURFACES IN OUTLET CONDUIT	Outlet conduit is inaccessible. Only the downstream end is visible. No distress was observed.	
INTAKE STRUCTURE	Submerged. Not visible.	
OUTLET STRUCTURE	A 50-foot-long approximately 8-foot-deep and 8-foot-wide rectangular open channel. In good condition. Only minor concrete spalling.	
OUTLET CHANNEL	No obstructions that would significantly affect discharge capacity of the outlet works.	
EMERGENCY GATE	Flow through the outlet works is controlled by manually placed stop logs.	



VISUAL INSPECTION  
PHASE I  
UNGATED SPILLWAY

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
CONCRETE WEIR	20-foot-wide, 2-1/2-foot-deep rectangular concrete overflow section. In good condition.	
APPROACH CHANNEL	Lake. Free of debris and obstructions.	
DISCHARGE CHANNEL	Rectangular concrete channel. In good condition.	
BRIDGE AND PIERS	There is no bridge over the control section of the emergency spillway.	

VISUAL INSPECTION  
PHASE I  
GATED SPILLWAY

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
CONCRETE SILL	N/A.	
APPROACH CHANNEL	N/A.	
DISCHARGE CHANNEL	N/A.	
BRIDGE PIERS	N/A.	
GATES AND OPERATION EQUIPMENT	N/A.	

VISUAL INSPECTION  
PHASE I  
INSTRUMENTATION

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
MONUMENTATION/SURVEYS	None.	
OBSERVATION WELLS	None.	
WEIRS	None.	
PIEZOMETERS	None.	
OTHER	None.	

VISUAL INSPECTION  
PHASE I  
RESERVOIR  
OBSERVATIONS

VISUAL EXAMINATION OF	REMARKS OR RECOMMENDATIONS
SLOPES	Gentle to moderately steep. Some shoreline erosion.
SEDIMENTATION	Unknown.
UPSTREAM RESERVOIRS	None significant.



VISUAL INSPECTION  
PHASE I  
DOWNSTREAM CHANNEL

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
CONDITION (OBSTRUCTIONS, DEBRIS, ETC.)	There are no obstructions that would affect the discharge capacity of the spillway.	
SLOPES	No apparent instability (immediately downstream from the dam).	
APPROXIMATE NUMBER OF HOMES AND POPULATION	There are two homes approximately one mile downstream from the dam. Population: 8 (estimated). The town of DuBois is located about four miles downstream from the dam.	

**APPENDIX B**  
**CHECKLIST**  
**ENGINEERING DATA**  
**DESIGN, CONSTRUCTION, OPERATION**  
**AND HYDROLOGIC AND HYDRAULIC**  
**PHASE I**

# APPENDIX B

## CHECKLIST

ENGINEERING DATA  
DESIGN, CONSTRUCTION, OPERATION  
PHASE I

NAME OF DAM Lake Sabula Dam

ID# NDI I.D. PA-425

DER I.D. 17-10

ITEM	REMARKS
AS-BUILT DRAWINGS	Not available.
REGIONAL VICINITY MAP	See Plate 1.
CONSTRUCTION HISTORY	Reportedly, the dam was designed and constructed by Pennsylvania Railroad Company in 1870.
TYPICAL SECTIONS OF DAM	Not available.
OUTLETS - PLAN - DETAILS - CONSTRAINTS - DISCHARGE RATINGS	Not available.

CHECKLIST  
ENGINEERING DATA  
DESIGN, CONSTRUCTION, OPERATION  
PHASE I

ITEM	REMARKS
RAINFALL/RESERVOIR RECORDS	Not recorded.
DESIGN REPORTS	Not available.
GEOLOGY REPORTS	Not available.
DESIGN COMPUTATIONS HYDROLOGY & HYDRAULICS DAM STABILITY SEEPAGE STUDIES	Not available.
MATERIALS INVESTIGATIONS BORING RECORDS LABORATORY FIELD	Not available.



CHECKLIST  
ENGINEERING DATA  
DESIGN, CONSTRUCTION, OPERATION  
PHASE I

ITEM	REMARKS
POST CONSTRUCTION SURVEYS OF DAM	None reported.
BORROW SOURCES	Unknown.
MONITORING SYSTEMS	None.
MODIFICATIONS	The existing spillway and outlet works were constructed in about 1964.
HIGH POOL RECORDS	Not recorded. To the best knowledge of the owner, the highest pool level in recent years occurred during the passage of Tropical Storm Agnes in 1971, at which time, the pool was about 2 feet above the emergency spillway crest level.

CHECKLIST  
ENGINEERING DATA  
DESIGN, CONSTRUCTION, OPERATION  
PHASE I

ITEM	REMARKS
POST CONSTRUCTION ENGINEERING STUDIES AND REPORTS	None reported.
PRIOR ACCIDENTS OR FAILURE OF DAM DESCRIPTION REPORTS	None reported.
MAINTENANCE OPERATION RECORDS	Not maintained.
SPILLWAY PLAN SECTIONS DETAILS	Not available.
OPERATING EQUIPMENT PLANS AND DETAILS	Not available.

CHECKLIST  
ENGINEERING DATA  
HYDROLOGIC AND HYDRAULIC

DRAINAGE AREA CHARACTERISTICS: 3.6 square miles (wood and pastureland)  
ELEVATION; TOP NORMAL POOL AND STORAGE CAPACITY: 1461 (307 acre-feet)  
ELEVATION; TOP FLOOD CONTROL POOL AND STORAGE CAPACITY: 1463.5 (500<sup>+</sup> acre-feet)  
ELEVATION; MAXIMUM DESIGN POOL: 1463.5  
ELEVATION; TOP DAM: 1463.5 (measured low spot adjacent to emergency spillway)  
SPILLWAY:

- a. Elevation 1461
- b. Type Concrete overflow section
- c. Width 20 feet (perpendicular to flow)
- d. Length 60<sup>+</sup> feet
- e. Location Spillover Adjacent to emergency spillway channel
- f. Number and Type of Gates None

OUTLET WORKS:

- a. Type 4-foot by 8-foot reinforced concrete conduit
- b. Location At center of embankment
- c. Entrance Inverts 1451<sup>+</sup> (estimated)
- d. Exit Inverts 1445<sup>+</sup>
- e. Emergency Draindown Facilities Stop logs

HYDROMETEOROLOGICAL GAGES:

- a. Type None
- b. Location None
- c. Records None

MAXIMUM NONDAMAGING DISCHARGE: Spillway capacity



APPENDIX C  
PHOTOGRAPHS

LIST OF PHOTOGRAPHS  
LAKE SABULA DAM  
NDI I.D. NO. PA-425  
APRIL 4, 1979

PHOTOGRAPH NO.

DESCRIPTION

- |   |  |
|---|--|
| 1 | Crest (looking east). Structure left of center: primary spillway intake.                 |
| 2 | Emergency spillway discharge channel (right), primary spillway discharge channel (left). |
| 3 | Primary spillway discharge channel (looking downstream).                                 |
| 4 | Shoreline erosion on upstream slope.   |

DRAWN BY ACS CHECKED BY 3E DRAWING 78 67-A34  
 5-29-79 APPROVED BY JTH 6-4-79



STORAGE, WOLF CREEK, KYLE,  
 LAKE RENE, LAKE SABULA,  
 GALION BAY AND CLOE DAM

GEOLOGY MAP

REFERENCE

GEOLOGIC MAP OF PENNSYLVANIA PREPARED  
 BY COMMONWEALTH OF PENNA. DEPT. OF INTERNAL  
 AFFAIRS, DATED 1960, SCALE 1" = 4 MILES

**D'APOLONIA**



DRAWN BY  
 ACS  
 6-1-79  
 CHECKED BY  
 6-4-79  
 APPROVED BY  
 6-4-79  
 DRAWING NUMBER  
 7-A35

## PENNSYLVANIAN

### APPALACHIAN PLATEAU

- Pm** **Monongahela Formation**  
*Cyclic sequences of sandstone, shale, limestone and coal; limestone prominent in northern outcrop areas; shale and sandstone increase southward; commercial coals present; base at the bottom of the Pittsburgh Coal.*
- Pc** **Conemaugh Formation**  
*Cyclic sequences of red and gray shales and siltstones with thin limestones and coals; massive Mahoning Sandstone commonly present at base; Ames Limestone present in middle of section; Brush Creek Limestone in lower part of section.*
- Ps** **Allegheny Group**  
*Cyclic sequences of sandstone, shale, limestone and coal; numerous commercial coals; limestones thicken westward; Vanport Limestone in lower part of section; includes Freeport, Kittanning, and Clarion Formations.*
- Pp** **Pottsville Group**  
*Predominantly sandstones and conglomerates with thin shales and coals; some coals mineable locally.*

### ANTHRACITE REGION

- Pop** **Post-Pottsville Formations**  
*Brown or gray sandstones and shales with some conglomerate and numerous mineable coals.*
- Pp** **Pottsville Group**  
*Light gray to white, coarse grained sandstones and conglomerates with some mineable coal; includes Sharp Mountain, Schuylkill, and Tumbling Run Formations.*

## MISSISSIPPIAN

- Mmc** **Mauch Chunk Formation**  
*Red shales with brown to greenish gray silty sandstones; includes Greenbrier Limestone in Fayette, Westmoreland, and Somerset counties; Loyalhanna Limestone at the base in southwestern Pennsylvania.*
- Po** **Pocono Group**  
*Predominantly gray, hard, massive, cross-bedded conglomerate and sandstone with some shale; includes in the Appalachian Plateau Burgoon, Shenango, Cuyahoga, Cassawago, Corry, and Knapp Formations; includes part of "Oswayo" of M. L. Fuller in Potter and Tioga counties.*

### GEOLOGY MAP LEGEND

**REFERENCE:**  
 GEOLOGIC MAP OF PENNSYLVANIA PREPARED  
 BY COMMONWEALTH OF PENNA. DEPT. OF INTERNAL  
 AFFAIRS, DATED 1960, SCALE 1" = 4 MILES

**D'ARPOLONLA**